Claims

1. A reversible hydrogen storage material comprising:

80 to 99.9 weight percent of an aluminum hydride; and

0.1 to 20 weight percent of a catalytic material adapted to increase the kinetics of hydrogen absorption/desorption of said aluminum hydride without significantly reducing the hydrogen storage capacity of said aluminum hydride.

2. The reversible hydrogen storage material according to claim 1, wherein said aluminum hydride has the formula $X(AlH_4)$, wherein X is an element chosen from Group IA alkali metals, Group IIA alkali earth metals, Group IIIB lanthanides, or Group IVB transition metals.

3. The reversible hydrogen storage material according to claim 2, wherein X is Na, Li, Zr, or Mg.

4. The reversible hydrogen storage material according to claim 1, wherein said catalytic material is a hydrogen storage alloy, a Raney catalytic material, or combinations thereof.

5. The reversible hydrogen storage material according to claim 4, wherein said hydrogen storage alloy is selected from rare-earth/Misch metal alloys, zirconium alloys, titanium alloys,

magnesium alloys, or combinations thereof.

6. The reversible hydrogen storage material according to claim 4, wherein said Raney catalytic material is selected from Raney nickel, Raney iron, Raney Cobalt, Raney Manganese, or combinations thereof.

7. A method of making a reversible hydrogen storage material comprising the steps of:

preparing a powder mixture comprising 80 to 99.9 weight percent of an aluminum hydride and 0.1 to 20 weight percent of a catalytic material adapted to provide said aluminum hydride with reversible hydrogen storage while not reducing the hydrogen storage capacity of said aluminum hydride; and

mechanically milling said mixture in an inert atmosphere.

8. The method according to claim 7, wherein said aluminum hydride has the formula $X(AlH_4)$, wherein X is an element chosen from Group IA alkali metals, Group IIA alkali earth metals, Group IIIB lanthanides, or Group IVB transition metals.

9. The method according to claim 8, wherein X is Na, Li, Zr, or Mg.

10. The method according to claim 7, wherein said catalytic material is a hydrogen storage alloy, a Raney catalytic material, or combinations thereof.

11. The method according to claim 10, wherein said hydrogen storage alloy is selected from rare-earth/Misch metal alloys, zirconium alloys, titanium alloys, magnesium alloys, or combinations thereof.

12. The method according to claim 10, wherein said Raney catalytic material is selected from Raney nickel, Raney iron, Raney Cobalt, Raney Manganese, or combinations thereof.